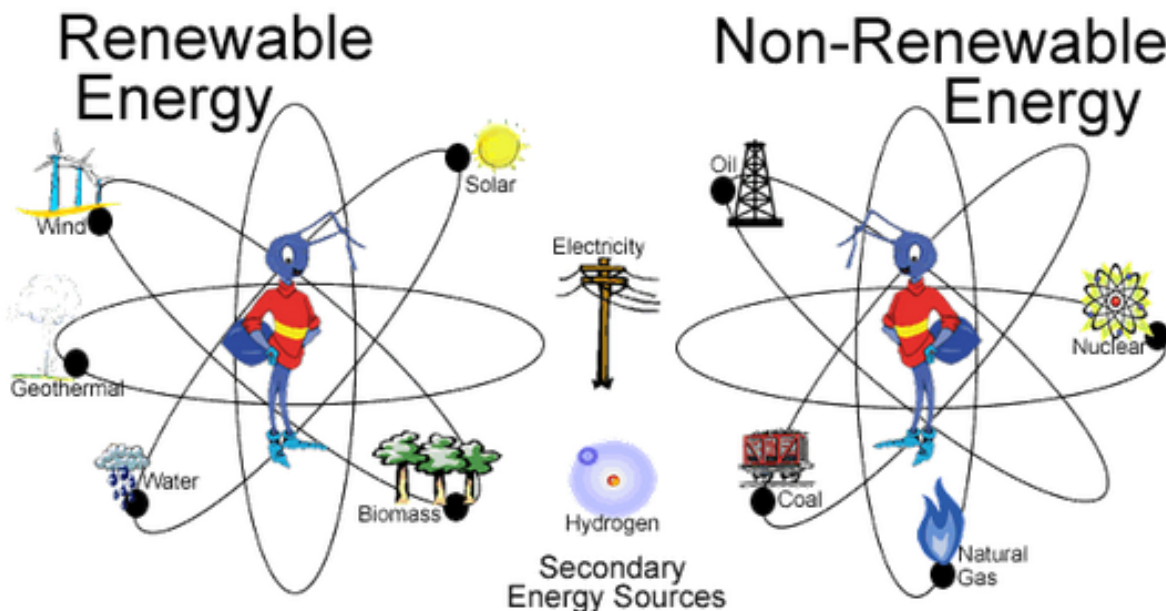


Bundle 6: Conservation of Energy Review Notes

Guiding Questions:

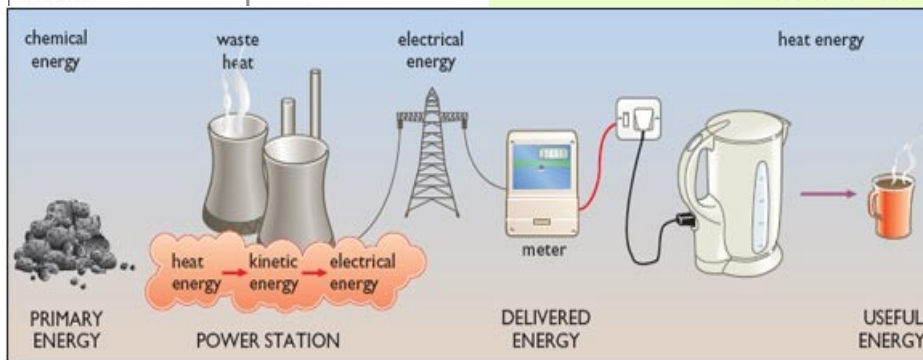
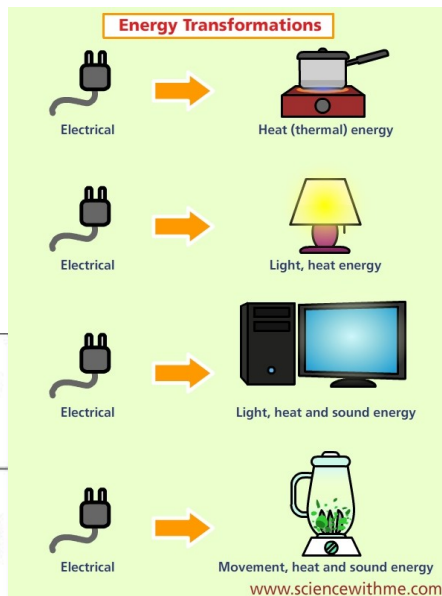
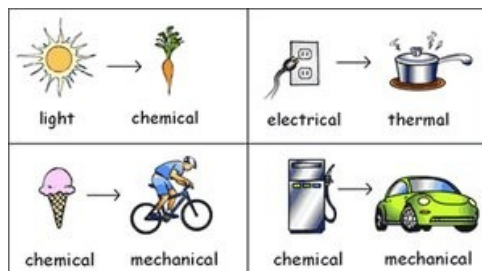
- What are the advantages and disadvantages of using natural resources in our home, school and community?
- What changes can be made to improve energy management within our home, school or community?
- How does energy change as it is transformed?

Visit your teacher's Wikispaces page for the notes on how each of these energy resources are transformed into useable (electrical) energy.



The Law of Conservation of Energy










Energy is not created or destroyed, it only changes from one form to another. In other words, the total amount of energy you start with is equal to the total amount that you end with even if it's in a different form.



THE EASY ENERGY ACTION PLAN 10 SIMPLE WAYS TO USE ENERGY WISELY

1	Turn off lights.	<input type="checkbox"/>
2	Use energy-saving light bulbs.	<input type="checkbox"/>
3	Shut off computers.	<input type="checkbox"/>
4	Use "smart" power strips.	<input type="checkbox"/>
5	Turn off entertainment devices when not in use (TV, game systems, etc.)	<input type="checkbox"/>
6	Use natural light, heat and cooling.	<input type="checkbox"/>
7	Unplug your phone charger when not in use.	<input type="checkbox"/>
8	Talk to your parents about ENERGY STAR appliances.	<input type="checkbox"/>
9	Talk to your parents about programmable digital thermostats.	<input type="checkbox"/>
10	Talk to your parents about home improvements (windows, doors, roofs, etc.)	<input type="checkbox"/>

Energy Source Comparison

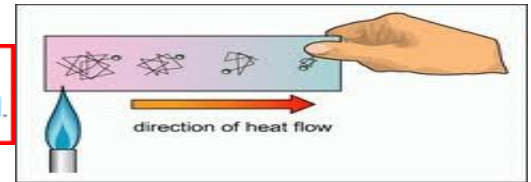
Energy Source	Pros	Cons
Solar Energy» 	Nonpolluting Most abundant energy source available Systems last 15-30 years	High initial investment Dependent on sunny weather Supplemental energy may be needed in low sunlight areas Requires large physical space for PV cell panels Limited availability of polysilicon for panels
Wind Energy» 	No emissions Affordable Little disruption of ecosystems Relatively high output	Output is proportional to wind speed Not feasible for all geographic locations High initial investment/ongoing maintenance costs Extensive land use
Hydropower» 	No emissions Reliable Capable of generating large amounts of power Output can be regulated to meet demand	Environmental impacts by changing the environment in the dam area Hydroelectric dams are expensive to build Dams may be affected by drought Potential for floods
Natural Gas» 	Widely available Cleanest-burning fossil fuel Often used in combination with other fuels to decrease pollution in electricity generation Made safe by adding artificial odor so that people can easily smell the gas in case of a leak	Transportation costs are high Lack of infrastructure makes gas resources unavailable from some areas Burns cleanly, but still has emissions Pipelines impact ecosystems
Petroleum» 	Efficient transportation fuel for the world Basis of many products, from prescription drugs to plastics Economical to produce Easy to transport	High CO2 emissions Found in limited areas Supply may be exhausted before natural gas/coal resources Possible environmental impact from drilling/transporting
Biomass» 	Abundant supply Fewer emissions than fossil fuel sources Can be used in diesel engines Auto engines easily convert to run on biomass fuel	Source must be near usage to cut transportation costs Emits some pollution as gas/liquid waste Increases emissions of nitrogen oxides, an air pollutant Uses some fossil fuels in conversion
Coal» 	Abundant supply Currently inexpensive to extract Reliable and capable of generating large amounts of power	Emits major greenhouse gases/acid rain High environmental impact from mining and burning, although cleaner coal-burning technology is being developed Mining can be dangerous for miners
Uranium» 	No greenhouse gases or CO2 emissions Efficient at transforming energy into electricity Uranium reserves are abundant Refueled yearly (unlike coal plants that need trainloads of coal every day)	Higher capital costs due to safety, emergency, containment, radioactive waste, and storage systems Problem of long-term storage of radioactive waste Heated waste water from nuclear plants harms aquatic life Potential nuclear proliferation issue
Geothermal» 	Minimal environmental impact Efficient Power plants have low emissions Low cost after the initial investment	Geothermal fields found in few areas around the world Expensive start-up costs Wells could eventually be depleted

Bundle 7: Thermal Energy Review Notes

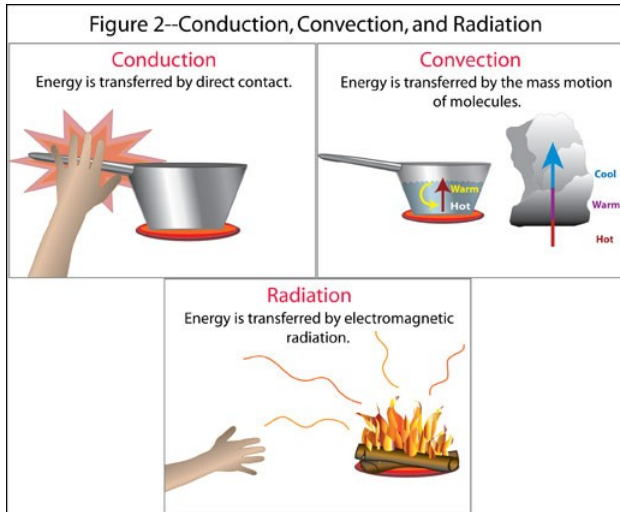
Guiding Questions:

- How does thermal energy move?
- How are conduction, convection and radiation different? How are they the same?

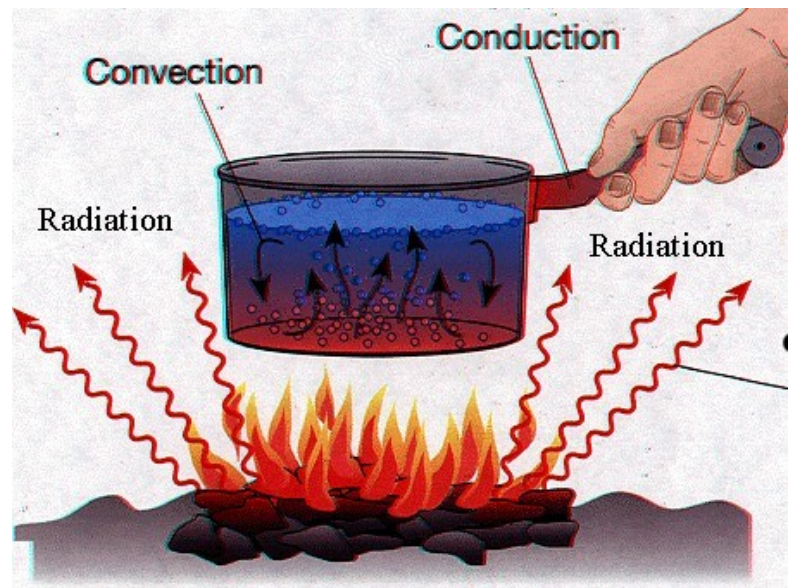
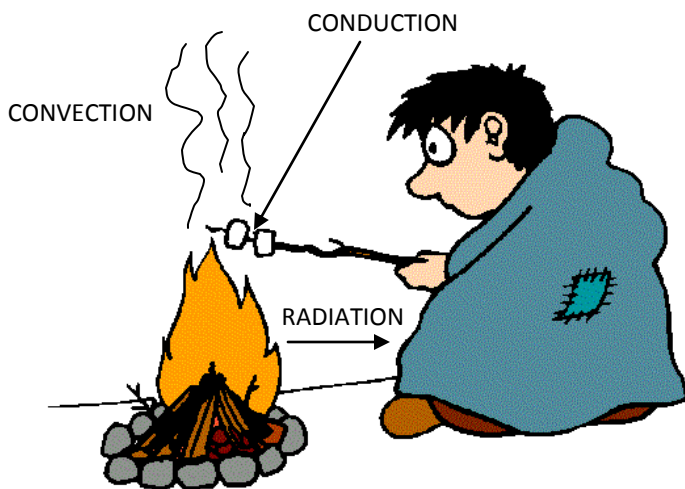
Thermal energy (heat energy) moves from one place to another because of the difference in temperature between them. The energy transfer is always from hot to cold.



Thermal energy moves in 3 ways ... conduction, convection and radiation.



	Definition	Example on the Sun	Example on the Earth
Convection	Currents are created when there are differences in temperature and density within a fluid	Convective currents swirl around until they pass through the photosphere	Cooling yourself by using a fan
Conduction	The transfer of heat by direct contact between two materials with different temperatures	NA (Remember that the Sun has no solid surfaces — it is a “ball of gas.”)	Heat loss through an exterior house wall
Radiation	The movement of heat waves	The way energy from the Sun’s core moves to the Sun’s surface	Cooking food in a solar oven



“Hey Duke, doesn’t that fire feel good.”



“Ouch! That poker’s too hot to hold with my bare hands.”



“I’ll turn on the fan. All the warmest air is up near the ceiling.”